

SWWT Plenary Meeting 37

Tuesday, 16 November 2016, 15:00 to 16:30

Room Delvaux, Kursaal, Ostend, Belgium

Present: about 100 participants

Agenda

1. Welcome and Introduction (Stefaan Poedts)
2. SSA SWE service network overview and development within Period 2 (Alexi)
3. The SSA Programme and SWE Segment status + view towards Period 3 (Jussi)
4. ESA R&D activities from the technology directorate (Alain Hilgers)
5. Report on the outcomes of the WMO congress (Toshiyuki Kurino)
6. TWG reports (TWG leaders)
7. H2020: potential for SW in COMPET-2017 call and other SWE related calls (Stefaan and Alexi)
8. Action Item Review (S. Poedts)
9. Any other business

Minutes

Welcome and Introduction (Stefaan)

SP welcomes everybody who was able to make it and apologizes for the technical problems with the mailing list (same as always but listserv was updated and apparently some things went wrong).

SSA SWE service network overview and development within Period 2 (Alexi)

AG started with reminding us of the SWE Network development aims for Period 2, incl. the operation and further development of the SSA SWE Coordination Centre, the further development of the concept of Expert Service Centres and evolving from legacy products towards SWE services, the expansion of the range of products available through the ESCs via the SWE portal, the strengthening of the links with the user communities, the establishment of a new ESC focusing on Heliospheric Weather, and the further development of the SWE Data Centre infrastructure to provide improved product access and additional data browsing capabilities supporting users and developers.

There are now five functioning ESCs, including the new ESC focusing on Heliospheric Weather. Users have to register for each product separately, as a result of the technical implementation of the registration but also for statistical purposes, i.e. to take track of which products are actually used intensively and which not. The [Space Weather Coordination Centre](#) is working extremely well. New in the user support is the link to 2nd line support. So through the SSCC the users have access to a wide network of SWE experts. The network products also grow continuously and the number of available products has vastly improved. The focus in the last two months was on acceptance testing for the new products. There are now 17 new SWE service pages which are displayed on the ESWW fair (right after the SWWT Plenary Meeting on ESWW13). There are 6 more service pages expected by the end of the activity (next year).

The federated network is structured in different layers: the individual products (SWE product layer), the service composition, and the user interface & tailoring layer. There are over 300 customer requirements and more than 1900 system requirements for the second layer (service composition). Further planning includes benchmark products for the service build-up, testing and operational demonstration, and a blueprint for a sustainable network of SWE service provision based on the distributed network, incl. service provision according to KPIs. The practical output is visible on the 17 new SWE Service Pages: <http://swe.ssa.esa.int>.

The federated network is working very well at the moment but requires an understanding of the heterogeneous system. Initial availability results indicate 98%, which is very close to the target (99%). Within Period 2 a number of common templates have been deployed as means for

reporting and information exchange. During 2016, 80 new products have been deployed with a consistent approach. The Shadow SLA approach uses a template provided by Airbus and involves ESCs implementing associated monitoring procedures. The first results are expected by April 2017.

Another major activity was the ESC Thematic Workshop at ESA/ESOC, Darmstadt (10-12 May 2016), with 70 participants from 18 member states. There were 32 sessions (incl. 8 inter-ESC sessions) focusing on new and in development products, external assets/new external development and inter-ESC products linkage. Currently more than 30 teams (close to 40) are spread across all 5 ESCs and more than 140 products are expected as a result of P2 developments. In P3 key assets and expertise will be identified, the roadmap will be reviewed and updated, and apart from some targeted development there will be a further development of the SWE Network as a system.

The SWWT could be involved in the review of the system if an external review is allowed (needs to be authorized by the program management).

See also slides AG (Annex 1).

The SSA Programme and SWE Segment status + view towards Period 3 (Jussi)

The objective of the SSA Programme is the protection of space and ground assets against adverse effects from space. The SSA Programme was initiated in April 2008 (ESA Council, SSA Enabling Resolution) and contains three main areas or segments: Space Weather (SWE), Near Earth Objects (NEO), and Technology R&D for Space Surveillance and Tracking (SST). It is executed in Periods: Period 1 was decided at MC in November 2008 (Prep. Programme), Period 2 was decided at MC12 in November 2012, and Period 3 will be decided on the MC 2016 on December 1 and 2.

SWE Network Evolution continues with pre-operational exploitation of the SWE system, integration of new groups and expertise, strengthening networking for products and data, the verification and validation of existing products (and their enhancement), and the introduction of new products. An operational system (8/5) with on-call support is the end goal. New ESCs are TBC.

SWE Data Utilisation: critical space & ground based data are secured through SLAs and there are agreements for data from international missions, like GOES, ACE, DSCOVR, GK2A,... The SWE data centre at Redu has data archives and will be used as a hub for data and product search throughout the federated network.

SWE Service Improvements: New applications will be developed to fill the gaps in the current service capability. These will be based on (European) physics-based models, e.g. heliospheric

modelling, ionospheric scintillation. Another focus is on the development of required models and tools utilizing L5 mission data. Next, there are focused target domains and regions, like power grids, Arctic region, etc. Clearly, SWE Service Development Roadmaps are regularly updated. The ESC service benchmarking and validation is also in the pipeline.

SSA SWE Space Segment architecture: this is a very expensive part of the programme, including L5 and L1 missions. The latter (L1) is mandatory, no doubt, as Solar monitoring data from the Sun-Earth line+ in-situ data from L1 are mandatory for SWE services. There is hope that the USA (NOAA, not NASA!) will do a L1 mission so that ESA can focus on a L5 mission. If not, ESA will take the lead on the L1 mission. The Distributed SWE Sensor System (D3S) will mostly take advantage of flight opportunities. Regarding the Lagrange (L1/L5) mission, see slide 11 for mandatory observations for L1 and L5 missions, and slide 12 for the enhanced observations (but these will not survive the budget limitations). The instruments are basically the same for both missions so that the decision can be postponed, awaiting the initiative of the USA. It is remarked, though, that the telemetry is not the same for both missions and it will be checked that the current infrastructure is appropriate. The launch is foreseen for 2023. Decision to go to L1 or L5 will be made by the end of 2018, after Phase A/B1 (which will start in the beginning of 2017). It is remarked that the USA may still abort the project, even after Phase B2. The cost estimate shows that L1 mission costs about 470 M€, while a L5 mission would cost 550 M€. India also has a proposal for a L1 mission, and China is thinking about a L5 mission. Note, however, that these are science missions, while we want an operational mission.

SSA Period 3 Budget: Proposal for MC in 2.5 weeks:

• SWE segment:	76 M€
• NEO segment:	30 M€
• SST segment:	30 M€
• Lagrange Mission preparation:	51 M€
Total:	187 M€

See also slides JPL (Annex 2).

ESA R&D activities from the technology directorate (Alain Hilgers)

Alain was not present and did not receive the invitation for this meeting as something went wrong with the mailing list. SP apologizes for that. Piers Jiggins (PJ) gave a short report (without slides) and referred to Session 9 (the next day) where the R&D activities of the ESA technology directorate will be discussed. PJ mentioned the ongoing projects, like the Virtual Space Weather monitoring System – Part 2 (full deployment), and the main new ITTs.

Report on the outcomes of the WMO congress (Toshiyuki Kurino)

The World Meteorological Organisation (WMO) is involved in Space Weather, as it is a specialized agency of the UN for meteorology (weather and climate) , operational hydrology and related geophysical sciences. These are all driven by societal needs and the WMO programmes result ultimately in societal benefits, such as disaster risk reduction, resilience to climate variability and change, economic growth, etc. The WMO space programme has 4 main components, viz. the Space-Based observation system, Access to satellite data and products, Awareness and Training, and Space Weather Coordination.

WMO Space Programme's objectives are to be achieved through strong partnership with CGMS (Coordination Group for Meteorological Satellites, a technical coordination body of satellite operators including space agencies focusing primarily on weather and climate satellite programmes in response to WMO requirements), and co-sponsoring international science groups: ITWG, IWWG, IPWG, IROWG and ICWG.

The IROWG (International Radio Occultation Working Group) was established as a permanent working group of CGMS in 2009, co-sponsored by CGMS and WMO. The IROWG serves as a forum for operational and research users of radio occultation data. IROWG has in particular been set up to further exploit radio occultation data.

The WMO contribution to space weather is driven by the societal demand for SW services as a result off the growing dependence on technologies impacted by space weather. In 2014 CGMS decided to include objectives related to space weather monitoring into its multi-year High-Level Priority Plan (HLPP) and agreed on Terms of Reference for CGMS Space Weather Activities. It is anticipated that CGMS will soon extend the scope of its activity towards space-based observation of space weather variables. A Space Weather Task Team (SWTT) was organized to define the methodology for the implementation of space weather into CGMS.

More details and interesting links to the WMO web pages can be found in the slides of Toshi Kurino (Annex 3).

TWG reports (TWG leaders)

Drivers of Space Weather - Solar Magnetic Topology (H. Lundstedt)

No report has been delivered.

Drivers of Space Weather - Solar Storms (O. Malandraki)

Olga Malandraki, Spokesperson on 'Solar Energetic Particles' of the Subgroup on 'Solar Storms' of the Topical Group 'Drivers of Space Weather' reported the activity of organization during the 13th European Space Weather Week of Session 4: 'Flares, Coronal Mass Ejections and Solar Energetic Particles: Space Weather Impact', which encompasses all the different solar storm phenomena and their space weather effects. The session received a lot of attention by the community and was very well attended with about 60 Abstracts submitted and relevant presentations carried out during the conference.

Following contact by the Dr. Anna Belehaki and Dr. Jean Lilensten Editors in Chief of the Journal of Space Weather and Space Climate who suggested the possibility to have a special issue on the session the conveners of the session have decided to have a Topical Issue with the topic of the session in the ESWW13. Topical Editors in Chiefs will be Dr. Nicole Vilmer and Dr. Olga Malandraki, and associate editors the rest of the convener organizers of the session at ESWW13. It was decided that the Topical Issue will be open to the community and several advertisements and call for intent will be issued shortly at several newsletters.

Ground Effects (A. Viljanen)

The highlights of the GETG activities are.

- Within the ESA Space Situational Awareness programme, a GIC service has been released for power grids, and a corresponding pipeline service will soon be published too (<http://swe.ssa.esa.int/geomagnetic-conditions>).
- There was European contribution to the NASA Living With a Star Institute GIC Working Group in March 2015 to August 2016. A collection of related papers will appear in Space Weather (Pulkkinen, A. (2016), Introduction to NASA Living With a Star (LWS) Institute GIC Working Group Special Collection, Space Weather, 14, doi:10.1002/2016SW001537).

Atmospheric Effects (S. Bruinsma)

ESA/Swarm low-resolution neutral densities inferred from GPS tracking have been validated and will be made available early next year. The Swarm accelerometer inferred densities are still not entirely validated.

ESA selected three consortia to study the GOCE re-entry (actually the last 3 weeks of the mission) and the final presentations took place at ESOC on 23-24 November 2016. The final reports will become available early 2017.

The DTM2013 thermosphere model uses the 30 cm radio flux (F30) instead of the well-known F10.7. The F30 is currently made available (archive and forecast) on the daily-updated CLS space weather website (<https://spaceweather.cls.fr>).

Ionospheric Effects (M. Angling)

Matthew Angling reported on combined test plans for atmospheric models. Involvement in road mapping. Plans for next year(s), involving GNSS users, CCMC activities, attachment to ESCs.

Spacecraft, Launcher and Aircraft Environments (S. McKenna-Lawlor)

No report has been delivered.

Education, Outreach and Emerging Markets (P. Vanlommel)

The topical group 'Education, Outreach and Emerging Markets' wants to communicate and disseminate space weather science in order to valorize this science.

We want to strengthen the space weather community and link the different component of this community with each other.

- The European Space Weather Week fits very well this goal. SWWT is involved in the local and programme organization of this annual conference providing support to the space weather community involved in science, engineering activities, decision making, commercial businesses, etc.
- The SIDC Belgium will set up a permanent educative center in support of its space weather forecasters. Concrete, in 2017 a basic course space weather will be given for space weather operators. The SIDC has the intention to organize it recurrent.
- We foresee a memorandum between the different space weather service centers concerning communication with the general public through press releases about space weather events. The memorandum settles the FYI concept. It opens the door to share contacts.
- Promote services and products in support of space weather services, e.g. STAFF, JHelioviewer, Solar Demon, Cactus - all freely available. We want to extend this to products from others than SIDC.

We want to reach out to others than the SW community to raise awareness, educate and come to a possible involvement. We identify the person/group and bring a tailored message.

- JHelioviewer for schools. We had 4 3hour workshops 'direct your own solar movie' during the week of science, October 2016. We plan to offer this as a package to schools.
- Series of popular talks: for public observatories, for interested groups, at public events
- Follow up of extreme space weather events for the press by means of press releases.

- Weekly publication of an online Science Highlight for nonprofessionals, with an interest in space weather.
- Nice/Good to Know online publications on Sun-Space-Earth issues, e.g. STEREO 10years.

Space Weather Forecast (L. Trichtchenko)

Shaun Bloomfield advertised the working meeting (tomorrow) on forecast and another working meeting on CCMC collaboration on challenges.

H2020: potential for SW in COMPET-2017 call and other SWE related calls (Stefaan and Alexi)

- The Horizon 2020 Space WP 2017 structure includes COMPET (Competitiveness of the European Space sector Technology and Science, with some room for Space Weather, viz. in
 - COMPET-4-2017 Scientific data exploitation (budget 6 M€)
 - COMPET-5-2017 Space Weather (budget 3 M€)
 - COMPET-6-2017 Space portal (budget 0.5 M€)
 - and perhaps even COMPET-1-2017 Technologies for European non-dependence and competitiveness (budget 15 M€)

For more details see Annex 4a.

- The HORIZON2020 Space Advisory Group ADVICE ON POTENTIAL PRIORITIES FOR RESEARCH AND INNOVATION IN THE WORK PROGRAMME 2018-2020 report contains “Space Weather” 3 times, but it is not clear what the current status of this document is not what its purpose is. For more details see Annex 4b.
- JPL mentions that there also was a document on the “New Space strategy for Europe” and Space Weather is mentioned 6 times in that document (see Annex 4c). It is a pity that EU responsible still did not accept our invitation(s) to report on the EU activities on the Plenary meeting. They replied that they are not ready.

Action Item Review (S. Poedts)

There were no actions from last two meetings.

Any other business

none.

The meeting closed at 16:35.